



Climatic and ecological impacts of tropospheric sulphate aerosols on the terrestrial carbon cycle

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Tropospheric sulphate aerosols (TSA) may oxidise the photosynthesising tissues if they are taken up by plants. A parametrisation of this impact of tropospheric sulphate aerosols (TSA) on the terrestrial gross primary production is suggested. This parametrisation is implemented into the global Earth system model developed at the A.M. Obukhov Institute of the Atmospheric Physics, Russian Academy of Sciences (IAP RAS CM). With this coupled model, the simulations are performed which are forced by common anthropogenic and natural climate forcings based on historical reconstructions followed by the RCP 8.5 scenario. The model response to sulphate aerosol loading is subdivided into the climatic (related to the influence of TSA on the radiative transport in the atmosphere) and ecological (related to the toxic influence of sulphate aerosol on terrestrial plants) impacts. We found that the former basically dominates over the latter on the global scale and modifies the responses of the global vegetation and soil carbon stocks to external forcings by 10%. At regional scale, however, ecological impact may be as much important as the climatic one.